

## Compact Fiber Lasers for Coherent LIDAR, Phase I

Completed Technology Project (2005 - 2005)



## Project Introduction

This is a proposal to investigate the feasibility of developing a low cost, compact, lightweight, high power (>500m W) and narrow linewidth 1.5 and 1.06 micron fiber lasers based on a "virtual ring" laser cavity. We have already demonstrated "virtual ring" laser prototypes at 1.5 micron that push the performance envelope to unprecedented levels in a number of important parameters but with powers below 40 mW. In this research will increase the laser oscillator power to (>100 mw) and also boost it with a MOPA section. We will also investigate the feasibility of extending the virtual ring technology to the 1.06 micron band.

## Anticipated Benefits

We have already sampled moderate power "virtual ring" laser prototypes for potential defense applications. These include acoustic sensor system important for homeland defense. This application benefits from the low phase noise, low RIN and the outstanding frequency stability of the Eternal laser. This and other applications can benefit from further R&D of our base-line technology. In addition, a high power Eternal laser system can be important for coherent free space communications. LIDAR systems are also needed commercially for measurement of wind speed and vortices. Coherent laser radar (LIDAR) use heterodyne detection by mixing the laser light scattered from a remote target with a reference local coherent laser oscillator. This technique offers high sensitivity as well as providing detailed phase and velocity information important for many current and future NASA missions. These include: velocimetry, wind sensing and aerosol particle size distribution. In addition, coherent lasers are important for deep space and inter-satellite communications systems especially at 1.06  $\mu$ m.



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Langley Research Center (LaRC)

### Responsible Program:

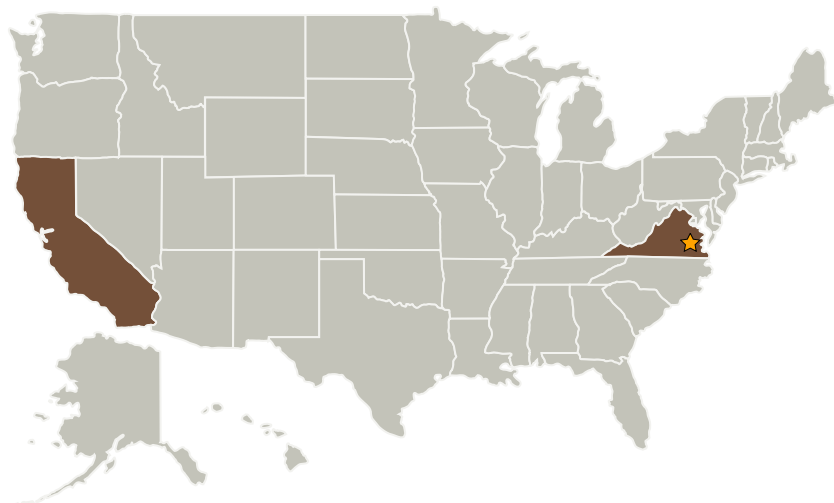
Small Business Innovation Research/Small Business Tech Transfer

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## Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Langley Research Center (LaRC)	Lead Organization	NASA Center	Hampton, Virginia
Orbits Lightwave, Inc.	Supporting Organization	Industry	Pasadena, California

## Primary U.S. Work Locations

California	Virginia
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Project Manager:**

Farzin Amzajerian

**Principal Investigator:**

Yaakov Shevy

## Technology Areas

**Primary:**

- TX08 Sensors and Instruments
  - └ TX08.1 Remote Sensing Instruments/Sensors
  - └ TX08.1.5 Lasers